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COMPLETED

FLOOD INSURANCE STUDY

ORIGINAL

CLARK COUNTY, OHIO

UNINCORPORATED AREAS

JULY 2, 1987

Federal Emergency Management Agency

COMMUNITY NUMBER - 390732

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NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

CLARK COUNTY,
UNINCORPORATED AREAS,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Unincorporated Areas of Clark County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Burgess & Niple, Limited (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-83-C-1191. This study was completed in April 1985.

1.3 Coordination

The first community meeting was held on April 22, 1983, and attended by representatives of Clark County, Ohio Department of Natural Resources (ODNR), (state coordinating agency), U.S. Soil Conservation Service (SCS), FEMA, and the Study Contractor. It was held to explain the nature and purpose of the Flood Insurance Study.

Upon the initiation of the study, a news release was placed in the "Springfield News Sun" on October 11, 1983, to state the study objectives and notify all interested persons to submit any relevant facts and technical data concerning local flood hazards.

A search for flood data was made at all levels of government, specifically the U.S. Army Corps of Engineers (COE), Louisville District; ODNR; U.S. Geological Survey (USGS); SCS; the Miami Conservancy District; and Clark County.

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Results of the hydrologic analyses were coordinated with USGS, COE, SCS, ODNR, Miami Conservancy District, and Clark County.

An intermediate meeting was held on April 8, 1985, to review the work as prepared by the Study Contractor with officials of the community. The County Engineer indicated the Enon-Xenia Road bridge over Mud Run will be replaced in 1985 and the study was revised to reflect this new bridge.

On July 9, 1986, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Clark County, Ohio. The area of study is shown on the Vicinity Map (Figure 1). The incorporated areas within the county were excluded from this study.

Flooding caused by overflow of portions of the Mad River, Beaver Creek, and Mud Run was studied by detailed methods within the county.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

Numerous additional streams were studied by approximate methods within the county.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through April 1990. The scope and methods of study were proposed to and agreed upon by FEMA and Clark County.

2.2 Community Description

Clark County is located in west-central Ohio. It occupies 398 square miles and contains 10 townships. Clark County is surrounded by Champaign, Madison, Greene, Montgomery, and Miami Counties. The population of Clark County was reported to be 150,236 in 1980, a decrease from the 1970 population of 157,115 (Reference 1).

The 1980 land use of Clark County was 82 percent agricultural, with the rest predominantly urban (Reference 2). The principal farm crops grown are corn and soybeans, and the county is ranked in the State of Ohio as Number 1 in beef product and Number 4 in nursery stock (Reference 3). Due to the expanding metropolitan area to the southwest of Clark County, increased acreage in the southwestern portion of Clark County is being used for residential housing and other nonagricultural uses. Development in the floodplain is primarily residential and agricultural.

The Mad River, which flows southerly through the western portion of Clark County, is 60.2 miles long with an average gradient of 8.5 feet per mile and has a drainage area of 656 square miles.

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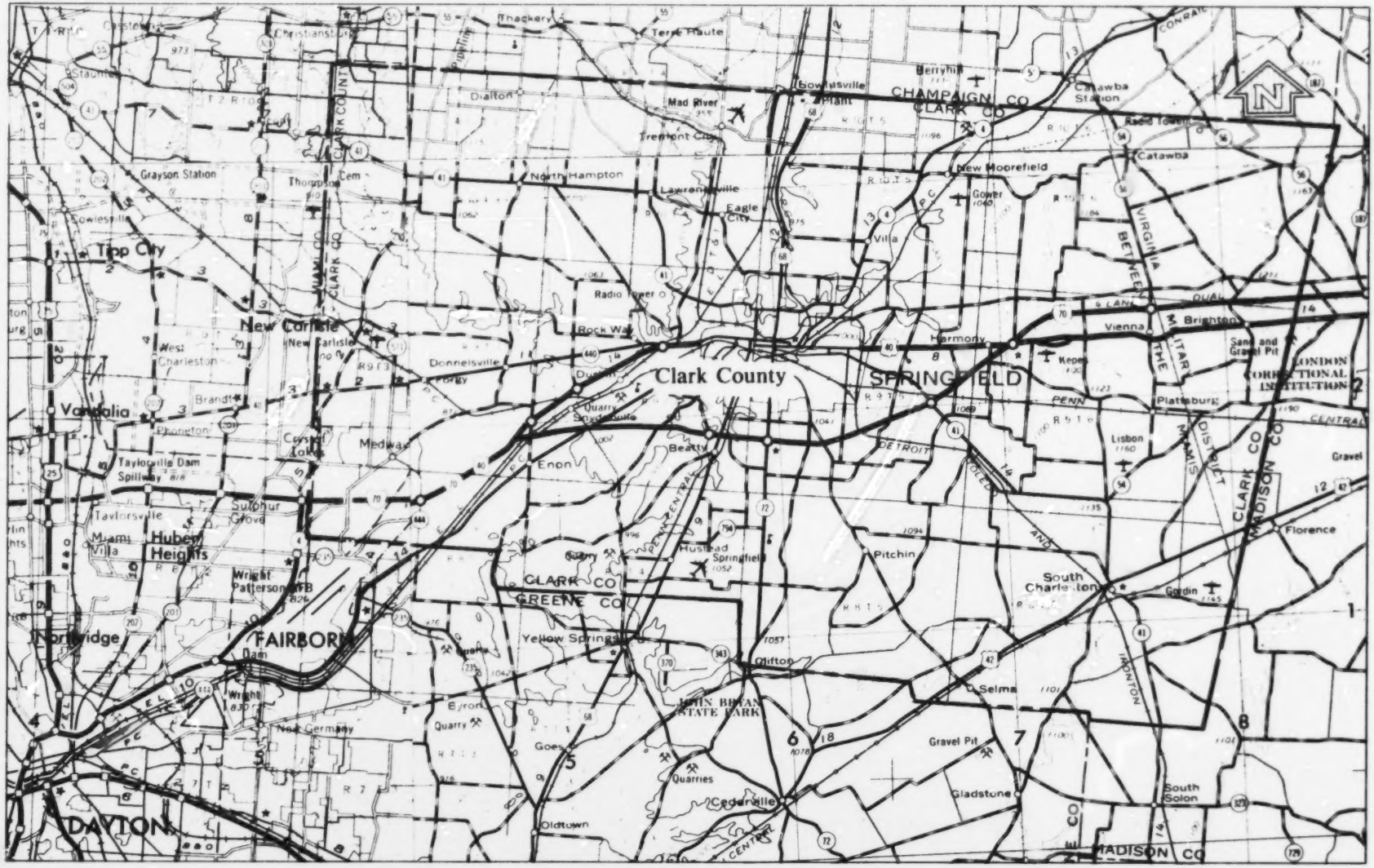

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

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Beaver Creek, a tributary that flows westerly through the northeast section of Clark County to Buck Creek, is 14.5 miles long with an average gradient of 17.8 feet per mile and has a drainage area of 37.6 square miles.

Mud Run, a tributary that flows westerly through the southwest section of Clark County to the Mad River, is 21.1 miles long with an average gradient of 14.2 feet per mile and has a drainage area of 27.5 square miles.

Clark County lies within the Wisconsin Age glaciated region of Ohio. The recession of the glaciers formed the present drainage patterns and topography of knobby hills and hummocky ridges along the moraines and level plains between the moraines. The relief ranges from level to steep but is predominantly undulating (References 4 and 5).

The soils of Clark County have been classified in 30 series, which can be placed in four groups according to their topographic position. The groups and their percent of the total area of the county are the following: soils of the uplands from glacial deposits, 68 percent; soils of the terraces from silt, sand, gravel, and clay deposited on the floodplains of glacial streams, 23 percent; bog or organic soils, 2 percent; and soils of the bottom land from deposits of the streams, 7 percent (References 4 and 5).

Clark County was once covered by a dense hardwood forest of oak, hickory, maple, beech, elm, and cherry trees. In addition, there was significant acreage of prairie and many small marshes and bogs. Today, most of this forest has been cleared (Reference 6).

The climate of Clark County is classified as continental and is marked by large annual daily and day-to-day ranges of temperature. Summers are moderately warm and humid, with an average temperature of 90 degrees Fahrenheit (°F). Winters are cold and cloudy with an average temperature of 5 °F. Records of the City of Springfield show for the period 1944 to 1965 a minimum temperature of -17 °F and a maximum of 103 °F, while the mean annual temperature is 53.0 °F and the mean annual precipitation is 38.93 inches (Reference 7).

2.3 Principal Flood Problems

Past flooding on the streams within Clark County indicates that flooding may occur during any season of the year. However, major floods have occurred from January to May and are usually the result of rains and may be worsened if the rain is accompanied by melting snow.

There have been a number of major floods on the Mad River. Four major floods occurred in March 1913, February 1929, January 1959, and March 1963. The discharges associated with these events recorded at the USGS Mad River Gage at Springfield, Ohio (No. 03269500) were 55,400 cubic feet per second (cfs), 23,000 cfs, 30,500 cfs, and 22,400 cfs, respectively. The estimated return periods for floods of these magnitudes are greater than 500-, 30-, 100-, and 25-years, respectively, and are based on the flood discharge-frequency analysis at the Springfield Gage (Reference 8).

There have been a number of major floods on Beaver Creek. Three major floods occurred in February 1948, January 1952, and January 1959. The

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discharges associated with these events recorded at the USGS Beaver Creek Gage at Springfield, Ohio (No. 03268500) were 4,980 cfs, 3,500 cfs, and 4,950 cfs, respectively. The estimated return periods for floods of these magnitudes are 75-, 10-, and 75-years, respectively, and are based on the flood discharge-frequency analyses at the Springfield Gage (Reference 8).

2.4 Flood Protection Measures

The Clarence J. Brown Reservoir, located on Buck Creek northeast of Springfield, serves as a flood protection facility. The dam, completed in 1972, provides 33,900 acre-feet and 26,800 acre-feet of flood storage for winter-spring and summer-fall discharges. The East Fork Buck Creek Conservancy District, serving part of Champaign County, constructed five floodwater retarding structures and 4 miles of channel improvements within the East Fork Buck Creek watershed between 1965 and 1968. The Springfield Conservancy District, serving all the lands within the corporate limits of the City of Springfield and extending not more than 1 mile beyond the limits, maintains Buck Creek and Beaver Creek within their area. Nonstructural measures for flood protection are also being used to aid in the prevention of future flood damage. These measures are in the form of land use regulations, adopted from the Code of Federal Regulations, that control building within areas that have a high risk of flooding (Reference 9).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The 10-, 50-, 100-, and 500-year discharges for Beaver Creek were computed from 20 years of recorded data at the Springfield gaging station (No. 03268500). Flood discharge-frequencies for the 10-, 50-, and 100-year events were determined by the USGS and presented in Bulletin 45, "Floods in

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Ohio, Magnitude and Frequency" (Reference 8). The 500-year discharges were extracted from the USGS final computer runs for Bulletin 45. The discharges at the gage were used in conjunction with the recommended transfer technique presented in Bulletin 45 to define discharges within the study reach.

The 10-, 50-, 100-, and 500-year discharges for the detailed study reach and the 100-year discharge for the limited detail study reach of the Mad River in Clark County were derived from recorded data at gaging stations upstream and downstream of the study reaches. The discharge records covered a 42-year period at the Urbana gaging station (No. 03267000) and a 65-year period at the Springfield gaging station (No. 032695000). Flood discharges for the 10-, 50-, and 100-year events at both stations were determined by the USGS and presented in Bulletin 45. The 500-year discharges were extracted from USGS final computer runs for Bulletin 45. The discharges at the Eagle City Gage (No. 032679000) were determined from the upstream and downstream gaging stations with the recommended transfer technique presented in Bulletin 45. The Eagle City gaging station had a period of record of only 10 years, which did not include some of the extreme events recorded at the upstream and downstream gages. The procedure outlined in Bulletin 45 was adopted to provide a better indication of flood discharges at the Eagle City Gage.

The 1974 floodplain information report on the Mad River and Buck Creek for Springfield and vicinity (Reference 10) also presented the 100-year discharge at the Mad River Springfield gaging station. A difference of less than 4 percent was found between the 100-year flood discharges in the floodplain information report and Bulletin 45. The floodplain information report values were averaged with those from Bulletin 45 to arrive at the discharges for Springfield Gage used in this study. This procedure was adopted to maintain reasonable continuity with the previous floodplain information report and also to maintain reasonable continuity of methodology for the current determinations along the Mad River.

The discharges within the study reaches on the Mad River were read from a log-log plot of discharge versus drainage area for the Urbana, Eagle City, and Springfield gaging stations.

There are no recorded streamflow data for the detailed study reach of Mud Run in Clark County. The 10-, 50-, and 100-year frequency events were determined from estimating equations previously referenced as Bulletin 45. The 500-year frequency discharge was determined from extrapolation of the referenced estimating equations.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

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TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA SQ MILES	PEAK DISCHARGES (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MAD RIVER					
just downstream of confluence of Minich Ditch	500	17,000	27,200	32,000	45,600
at Springfield Gage	490	16,800	26,800	31,700	44,600
just upstream of confluence of Buck Creek	323	11,800	18,100	21,000	28,000
at Eagle City Gage	310	11,600	17,400	20,100	26,600
just downstream of confluence of Chapman Creek	288	10,500	15,800	18,300	24,200
just downstream of confluence of Storms Creek	262	9,450	14,200	16,400	21,500
BEAVER CREEK					
at Springfield Gage	39.2	3,490	4,690	5,170	6,250
just downstream of confluence of Sinking Creek	36.7	3,160	4,330	4,810	5,910
just upstream of confluence of Sinking Creek	22.8	2,060	3,120	3,600	4,780
at Newlove Road	18.9	1,690	2,630	3,060	4,140
MUD RUN					
just upstream of Interstate 675	25.7	2,900	4,430	5,130	6,840
just downstream of confluence of Tributary No. 2	22.6	2,710	4,160	4,830	6,460
just upstream of confluence of Tributary No. 2	22.0	2,670	4,080	4,740	6,340
just downstream of confluence of Clear Creek	17.2	2,400	3,740	4,370	5,890
just upstream of confluence of Clear Creek	12.1	1,800	2,900	3,380	4,580

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Cross-section elevations for the overbank areas used in backwater analyses of the Mad River, Beaver Creek, and Mud Run were obtained from aerial photographs flown in November 1983 at a scale of 1:7200 (Reference 11). The channel sections were obtained by field measurements, and all bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. The hydraulic analysis data for the upstream portion of the Mad River studied in limited detail were taken from a floodplain information report, specifically, the portion of the Mad River from 32,200 feet to 45,000 feet above the confluence of Donnels Creek (Reference 10).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map.

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and floodplain areas. Roughness values for the main channel of the Mad River ranged from 0.030 to 0.035 and overbank roughness values ranging from 0.04 to 0.12 were used for all floods. Values for the floodplain of the upstream studied segment ranged from 0.03 to 0.035.

Roughness value for the main channel of the Beaver Creek was 0.035 with overbank values ranging from 0.04 to 0.12 for all floods.

A roughness value of 0.035 was used for the main channel of Mud Run and overbank roughness values ranging from 0.05 to 0.12 were used for all floods.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 step-backwater computer program (Reference 12). The computer model was calibrated using the 1959 historic floodwater profiles for a portion of the Mad River (Reference 13). Starting water-surface elevations for Mud Run, Beaver Creek, and the Mad River below Donnels Creek were calculated using the slope-area method. Starting water-surface elevations for the Mad River at U.S. Route 68 were taken from the COE's computations subsequent to the floodplain information report (Reference 10).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown. A portion of the profile for the Mad River has no 10-, 50-, or 500-year flood elevations because they were not calculated in the floodplain information report (Reference 10).

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

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All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:9600 with a contour interval of 4 feet (Reference 14).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for the Unincorporated Areas of Clark County (Reference 15).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this

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study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for Mud Run lie outside the corporate limits. The floodway from cross section I to cross section L on the Mad River was obtained from the floodplain information report (Reference 10). The floodway for a portion of the Mad River was not calculated due to limitations of the floodplain information report (Reference 10).

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

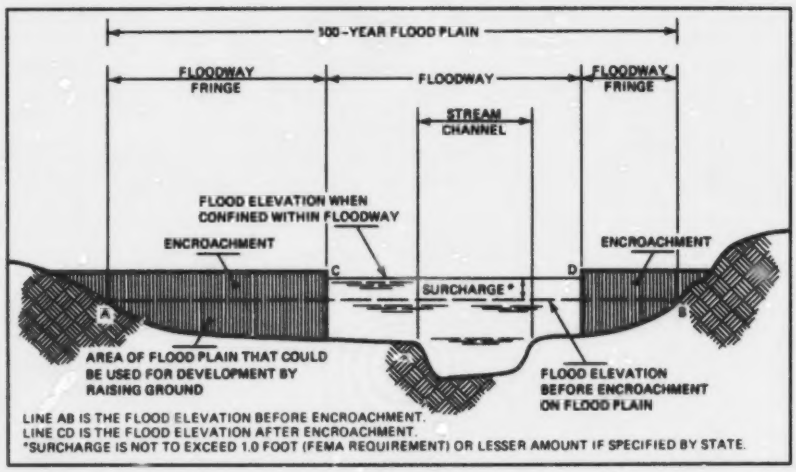
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
MAD RIVER								
A	220	1575	4666	6.9	864.3	864.3	864.8	0.5
B	2640	2100	11,015	2.9	869.6	869.6	870.4	0.8
C	5100	1150	7494	4.3	871.3	871.3	872.2	0.9
D	7740	960	8001	4.0	878.4	878.4	879.1	0.7
E	11,280	1100	10,360	3.1	880.8	880.8	881.8	1.0
F	15,520	385	4625	6.9	883.0	883.0	883.9	0.9
G	18,000	850	9162	3.5	887.3	887.3	888.0	0.7
H	21,300	1550	13,038	2.5	888.6	888.6	889.6	1.0
I	40,650	892	7496	4.3	904.1	904.1	904.6	0.5
J	42,500	486	5110	6.3	905.4	905.4	905.9	0.5
K	44,000	205	3127	7.0	906.5	906.5	907.0	0.5
L	44,950	185	3149	7.0	907.4	907.4	907.8	0.4
M	45,270	715	6545	3.2	907.9	907.9	908.7	0.8
N	47,310	1250	16,945	2.0	909.1	909.1	910.1	1.0
O	48,830	1400	10,400	2.0	909.4	909.4	910.4	1.0
P	50,610	600	3497	6.0	909.6	909.6	910.6	1.0
Q	52,430	460	3912	5.4	914.9	914.9	914.9	0.0
R	53,890	800	4040	5.2	916.5	916.5	917.2	0.7
S	59,890	1000	3650	5.8	923.8	923.8	924.8	1.0
T	62,890	500	3137	6.7	928.5	928.5	929.0	0.5
U	65,270	1600	5458	3.8	930.9	930.9	931.8	0.9

[1]FEET ABOVE CONFLUENCE OF DONNELS CREEK

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TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

FLOODWAY DATA

MAD RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
BEAVER CREEK								
A	11,630	65	848	6.1	1002.5	1002.5	1002.7	0.2
B	14,935	60	472	10.9	1008.9	1008.9	1009.0	0.1
C	19,010	300	1097	3.3	1022.9	1022.9	1023.8	0.9
D	20,130	300	1248	2.9	1025.1	1025.1	1025.7	0.6
E	21,230	150	697	5.2	1026.6	1026.6	1027.6	1.0
F	22,620	450	1715	2.1	1031.8	1031.8	1032.7	0.9
G	24,430	370	1737	2.1	1038.3	1038.3	1039.0	0.7
H	27,430	65	410	7.9	1046.9	1046.9	1046.9	0.0
I	28,930	66	662	4.9	1053.6	1053.6	1053.7	0.1
J	30,250	60	401	8.1	1054.6	1054.6	1055.3	0.7
K	31,710	45	292	11.1	1058.6	1058.6	1058.9	0.3

[1]FEET ABOVE MOUTH

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TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

FLOODWAY DATA

BEAVER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
MUD RUN								
A	18,340	155	895	5.4	844.8	844.8	845.1	0.3
B	19,880	400	1945	2.5	846.1	846.1	847.0	0.9
C	21,040	400	1801	2.7	846.8	846.8	847.8	1.0
D	22,305	225	623	7.8	849.3	849.3	849.4	0.1
E	22,800	90	783	6.2	851.3	851.3	852.0	0.7
F	23,220	250	1932	2.5	853.5	853.5	854.1	0.6
G	24,200	400[2]	2364	2.0	353.6	853.6	854.4	0.8
H	25,345	400	998	4.8	856.0	856.0	856.8	0.8
I	26,500	400	1669	2.9	858.2	858.2	859.2	1.0
J	26,800	400	1882	2.5	858.9	858.9	859.8	0.9
K	27,645	250	807	5.9	860.6	860.6	860.6	0.0
L	28,520	200	907	5.2	863.3	863.3	863.5	0.2
M	29,240	190	959	4.9	864.2	864.2	865.1	0.9
N	30,400	90	611	7.8	868.4	868.4	868.7	0.3
O	31,220	140	1399	3.4	870.8	870.8	871.6	0.8
P	32,260	300	2372	2.0	871.1	871.1	872.0	0.9
Q	33,480	300	1671	2.8	871.5	871.5	872.5	1.0
R	34,800	300	1323	3.6	872.6	872.6	873.5	0.9
S	35,940	210	1094	4.3	873.8	873.8	874.8	1.0
T	36,980	210	805	5.4	875.8	875.8	876.7	0.9
U	38,120	360	1222	3.6	878.5	878.5	879.5	1.0
V	39,160	340	1348	3.2	880.2	880.2	881.1	0.9
W	44,345	340	799	5.5	891.7	891.7	892.4	0.7
X	45,555	330	1021	4.3	894.5	894.5	895.3	0.8
Y	46,760	290	967	3.5	896.3	896.3	897.3	1.0

[1]FEET ABOVE MOUTH
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

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TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

FLOODWAY DATA

MUD RUN

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

A Flood Insurance Study for the City of Springfield has been published and is in agreement with this study (Reference 16).

A floodplain information report (Reference 10) contains a 100-year flood profile and delineation which differ slightly from this study. This is due to changes that have taken place on the floodplain since 1974, which include construction of new highways and bridges and increased commercial development.

Flood Insurance Studies have been published for the Unincorporated Areas of Champaign, Greene, Montgomery, and Miami Counties, and for the Village of Clifton (References 17-21).

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A Flood Insurance Study is in progress for the Village of Enon (Reference 22) and is in agreement with this study.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Unincorporated Areas of Clark County (Reference 15).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 300 South Wacker Drive, Chicago, Illinois 60606.

9.0 REFERENCES AND BIBLIOGRAPHY

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7. Ohio Department of Natural Resources, Division of Water, Climatic Guide for Selected Locations in Ohio, Marvin E. Miller, undated.

8. U.S. Geological Survey, Ohio Department of Natural Resources, Division of Water, Bulletin No. 45, Floods in Ohio, Magnitude and Frequencies, May 1977.

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10. U.S. Army Corps of Engineers, Louisville District, Floodplain Information, Mad River and Buck Creek, Springfield and Vicinity, Ohio, October 1974.

11. Photogrammetric Services, Inc., Aerial Photography, Scale 1:7200, November 1983.

12. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer Program 723-X6-L202A, HEC-2, Water-Surface Profiles, Davis, California, updated March 1982.

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13. Ohio Department of Natural Resources, Division of Water, Dayton to Springfield, Ohio Area, January 1959 Flood Profile, Mad River, October 1959.

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15. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Clark County, Unincorporated Areas, Ohio, October 1976.

16. Federal Emergency Management Agency, Flood Insurance Study, City of Springfield, Clark County, Ohio, December 1985.

17. ————, Flood Insurance Study, Champaign County, Unincorporated Areas, Ohio, April 1985.

18. ————, Flood Insurance Study, Green County, Unincorporated Areas, Ohio, October 1983.

19. ————, Flood Insurance Study, Montgomery County, Unincorporated Areas, Ohio, December 1981.

20. ————, Flood Insurance Study, Miami County, Unincorporated Areas, Ohio, January 1983.

21. ————, Flood Insurance Study, Village of Clifton, Clark and Greene Counties, Ohio, July 1980.

22. ————, Flood Insurance Study, Village of Enon, Clark County, Ohio, in progress.

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ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0165	862.44	chiseled square in northeast corner of northeast wingwall of Snider Road bridge over the Mad River
2	0165	880.33	chiseled square in northwest corner of concrete curb located at northeast end of Snider Road bridge over Interstate 70
3	0165	864.39	top of northwest anchor bolt in east leg of exit 47 signpost for State Route 4, located in Interstate 70 median strip near mile marker 46.65
4	0165	876.91	chiseled square in east abutment on north side of westbound State Route 4 bridge over the Mad River
5	0170	872.23	chiseled square in southwest corner of second concrete step to house no. 6508 located at corner of Lower Valley Pike and Enon Road
6	0170	879.89	chiseled square near southwest corner of top of southwest stone railing of Enon Road bridge over the Mad River
7	0170	874.931	U.S. Geological Survey standard disk stamped "874 Columbus" set in face of brick wall located on north side of northwest corner of Erie railroad station east of Enon Road
8	0170	872.14	railroad spike in west side of power pole "E145HL/4A-2" located along east side of Old Lower Valley Pike, about 1,300 feet west of Snyderville Road
9	0170	887.136	U.S. Geological Survey standard disk stamped "9CMN1954 Reset 1956" in west face and 3 feet from south end of pier no. 2 of State Route 4 bridge over abandoned railroad
10	0170	887.33	chiseled square in northwest corner of top of westerly abutment of abandoned railroad bridge over the Mad River

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ELEVATION REFERENCE MARKS (Continued)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
11	0170	889.84	chiseled square in top of westerly end of northerly stone abutment of Conrail bridge over the Mad River
12	0190	912.81	chiseled square in southeast wingwall of Conrail bridge over the Mad River and under U.S. Route 68 bridge
13	0190	908.84	chiseled square in southeast wingwall of private road bridge over the Mad River located about 2,000 feet upstream of southbound U.S. Route 68 bridge over the Mad River
14	0180	911.89	chiseled square in northwest corner of concrete base for traffic control box located at southeast corner of Upper Valley Pike and State Route 41
15	0180	926.99	chiseled square in southwest corner of north concrete curb, west of west end of westbound State Route 41 bridge over the Mad River
16	0180	915.92	chiseled square in southeast wingwall of Conrail bridge over the Mad River
17	0180	928.61	bolt head in chiseled square located in southeast wingwall of St. Paris Pike bridge over the Mad River
18	0180	942.73	chiseled square in corner of west end of northwest concrete wingwall of St. Paris Pike bridge over U.S. Route 68
19	0180	950.32	chiseled square in top of parapet of northwest wingwall of Eagle City Road bridge over U.S. Route 68
20	0180	931.02	top of bolt in northwest corner of gage station platform located at southwest end of Eagle City Road bridge over the Mad River (bolt head is cut off)
21	0180	926.168	U.S. Geological Survey standard disk stamped "927 Columbus" set in northeast corner of house located at southwest corner of intersection of St. Paris Pike and Eagle City Road

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ELEVATION REFERENCE MARKS (Continued)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
22	0211	1001.78	chiseled square in southwest corner of north abutment of Bird Road bridge over Beaver Creek
23	0211	1016.77	chiseled square in northeast corner of south abutment of Redmond Road bridge over Beaver Creek
24	0212	1028.78	northeast corner of south concrete abutment of private road bridge over Beaver Creek located approximately 1 mile downstream of Interstate 70
25	0212	1045.84	chiseled square in southeast corner of north headwall of box culvert under U.S. Route 40, located about 1,000 feet west of the interchange of U.S. Route 40 and Interstate 70
26	0216	1055.94	U.S. Geological Survey standard disk stamped "27RHM 1959 1056" set in top of northeast wingwall of eastbound U.S. Route 40 bridge over Beaver Creek
27	0280	847.28	chiseled square in southeast corner of south abutment of northbound Interstate 675 bridge over the Mad River
28	0280	852.71	chiseled square in top of southerly end of westerly abutment of Dayton-Springfield Road bridge over Mud Run
29	0280	857.97	chiseled square in northwest corner of northwest wingwall of private road bridge over Mud Run located about 2,700 feet downstream of Wescott Avenue bridge
30	0280	862.23	chiseled square on downstream end of easterly abutment of Wescott Avenue bridge over Mud Run
31	0280	866.74	chiseled square in southeast corner of southwest wingwall of private road bridge over Mud Run located about 1,800 feet upstream of Wescott Avenue bridge

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ELEVATION REFERENCE MARKS (Continued)

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
32	0280	902.56	railroad spike in south side of power pole marked "E 148 HM 17" located along north side of Stine Road, approximately 0.45 mile west of intersection with Enon-Xenia Road
33	0280	880.98	chiseled square on west end of north abutment of the Enon-Xenia Road bridge over Mud Run
34	0285	908.56	chiseled square on north end of west headwall of culvert under Fowler Road located 75 feet south of intersection with Rebert Pike
35	0285	897.17	chiseled square on northeast corner of north abutment of Fowler Road bridge over Mud Run
36	0285	915.95	U.S. Geological Survey standard disk stamped "12 CMN 1954 916" set in top of concrete monument located 38 feet southwest of intersection of Fowler Road and Fairfield Pike
37	0070	953.36	U.S. Coast and Geodetic Survey standard disk stamped "Z 34 1934" set vertically in east face of switch tower along west side of Conrail tracks, about 300 feet south of intersection of railroad and Tremont City Road
38	0065	946.15	U.S. Geological Survey standard gaging station disk (not stamped) set in north end of east stone abutment of Old Tremont Road steel bridge over the Mad River
39	0065	957.44	U.S. Geological Survey standard disk stamped "1 CMN 1954 957" set in west end of north concrete abutment of Upper Valley Pike bridge over Chapman Creek
40	0065	956.97	Champaign County benchmark stamped "ELEV 956.97" in south end of west abutment of the County Line Road bridge over the Mad River

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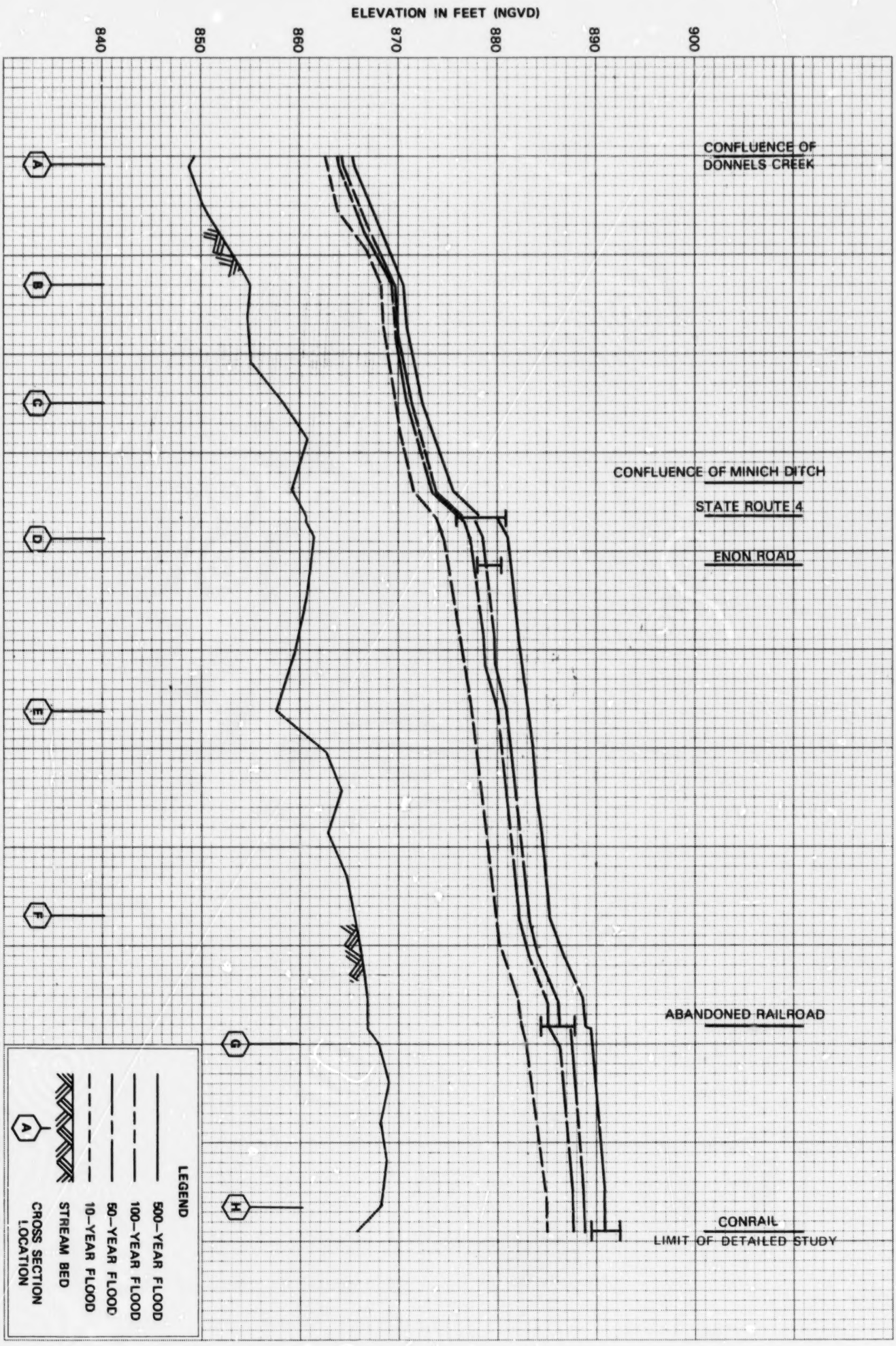

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FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

FLOOD PROFILES

MAD RIVER

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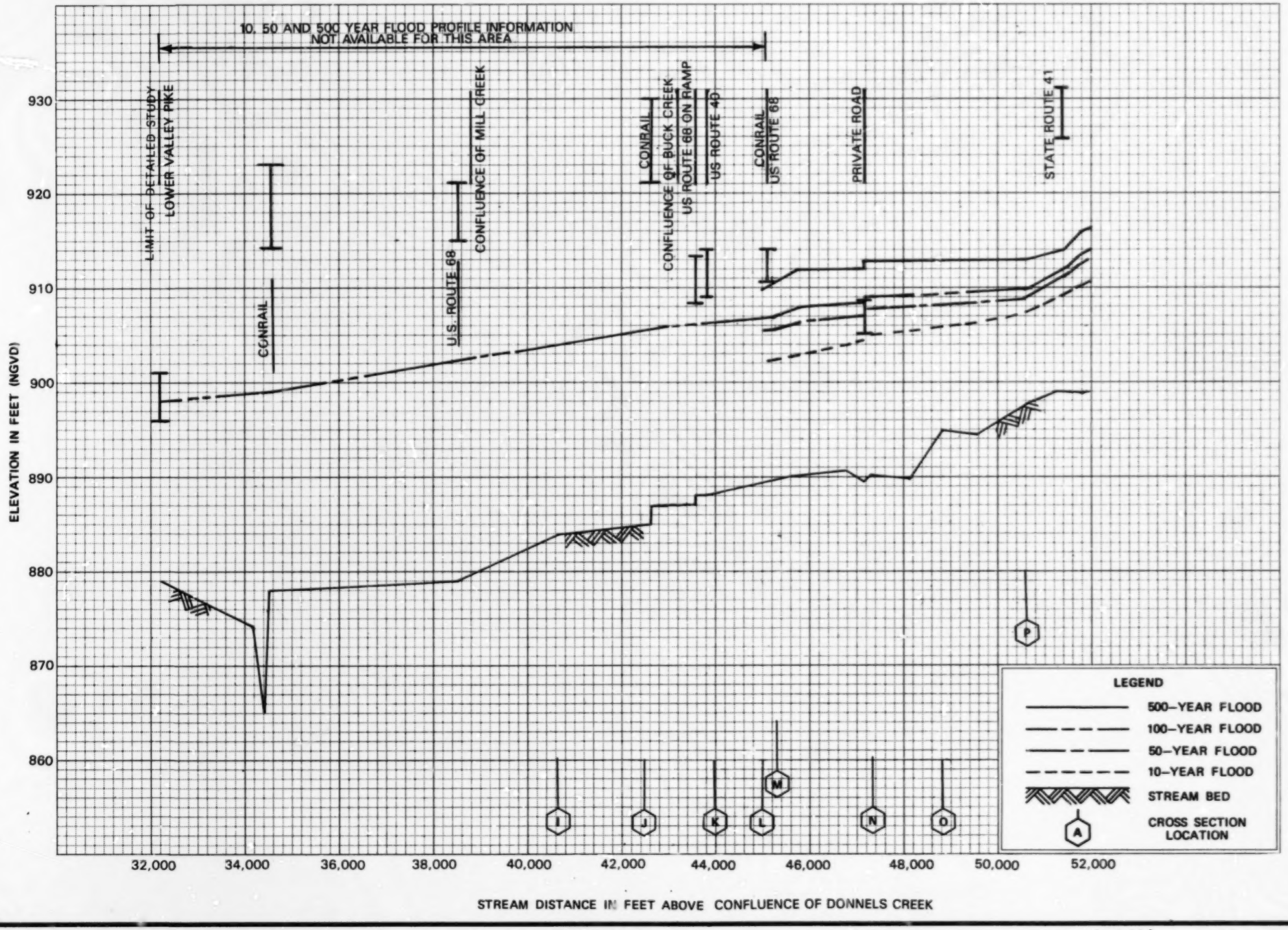

FLOOD PROFILES

MAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

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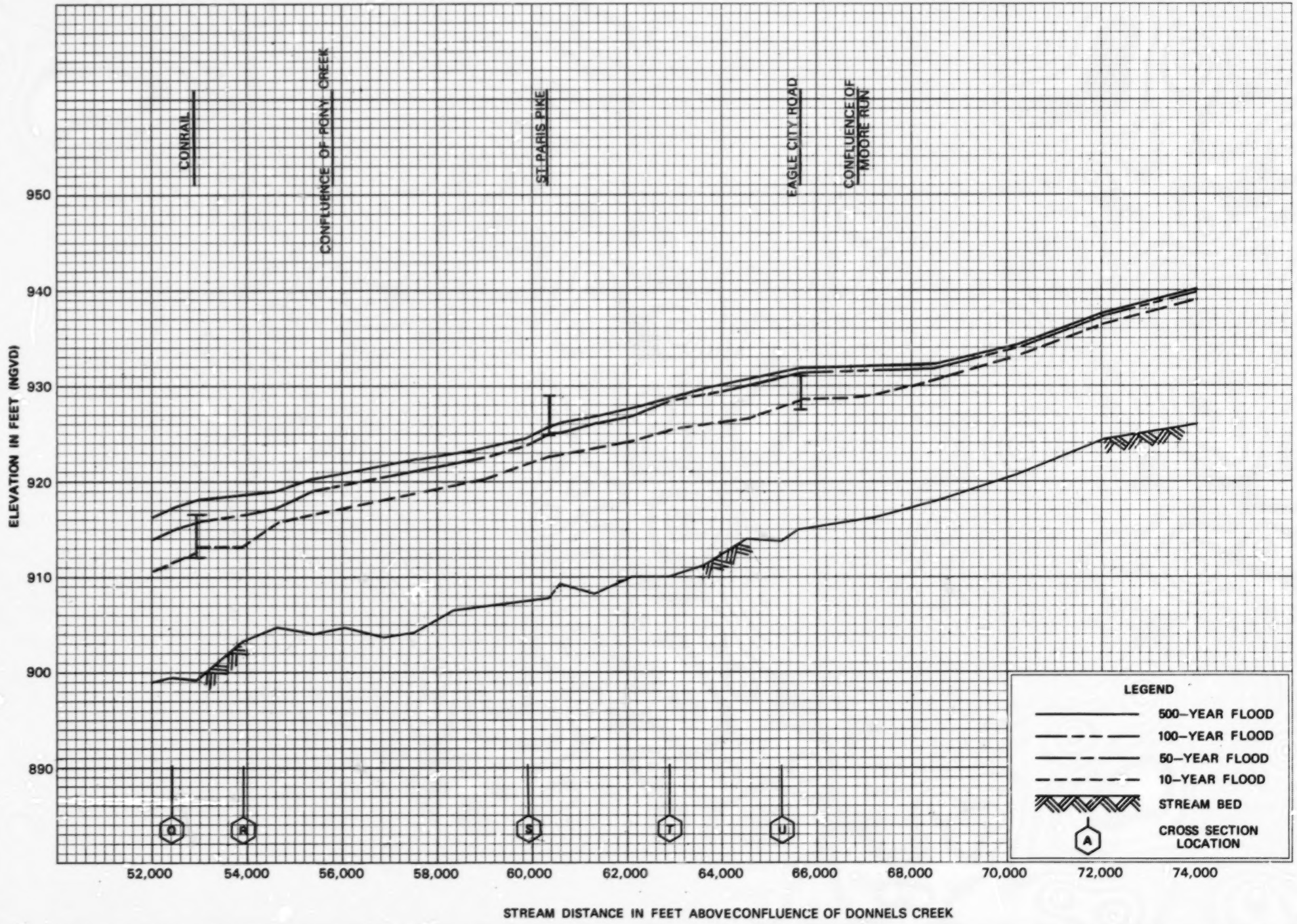

FLOOD PROFILES

MAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

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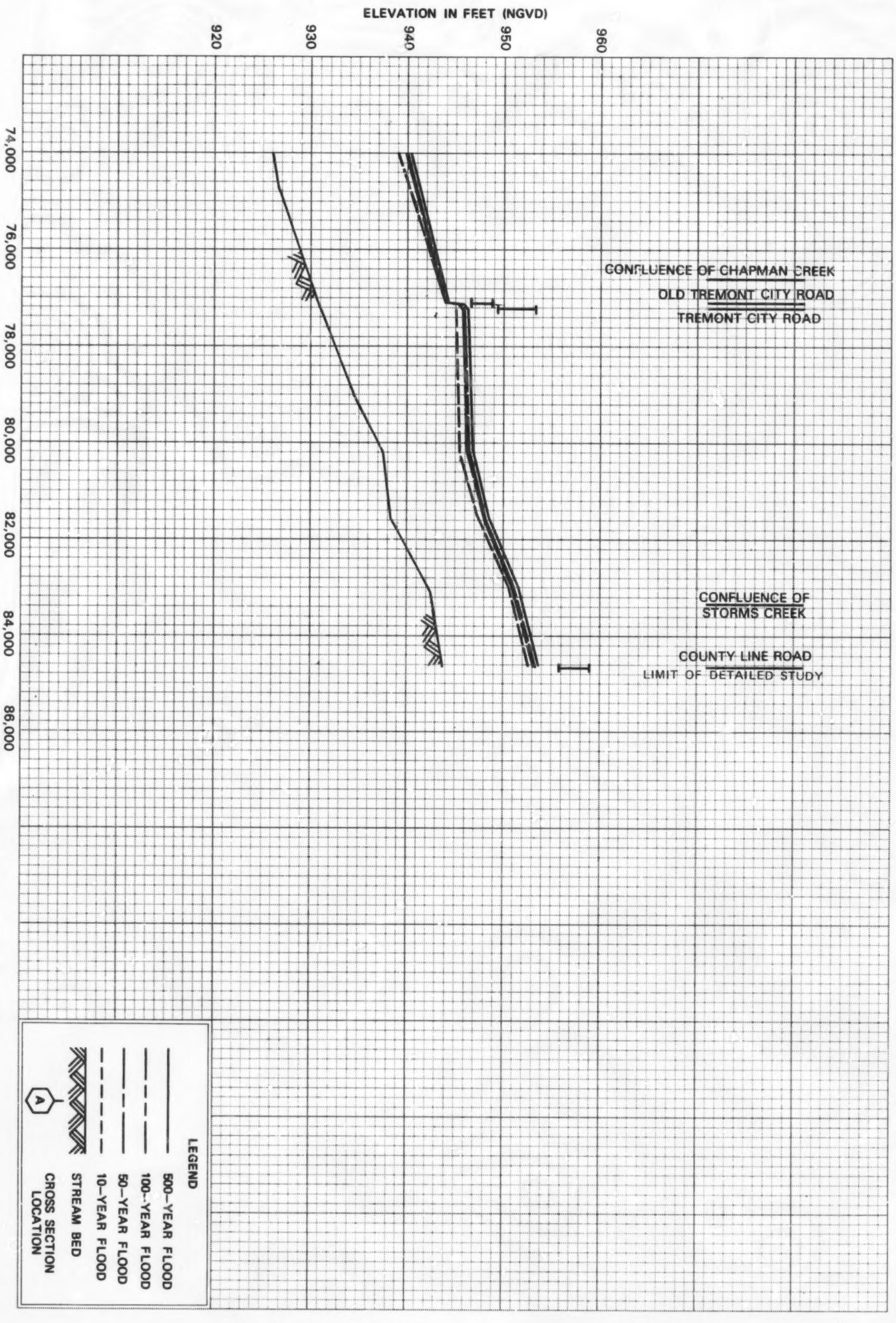

04P	FEDERAL EMERGENCY MANAGEMENT AGENCY CLARK COUNTY, OH (UNINCORPORATED AREAS)	FLOOD PROFILES MAD RIVER

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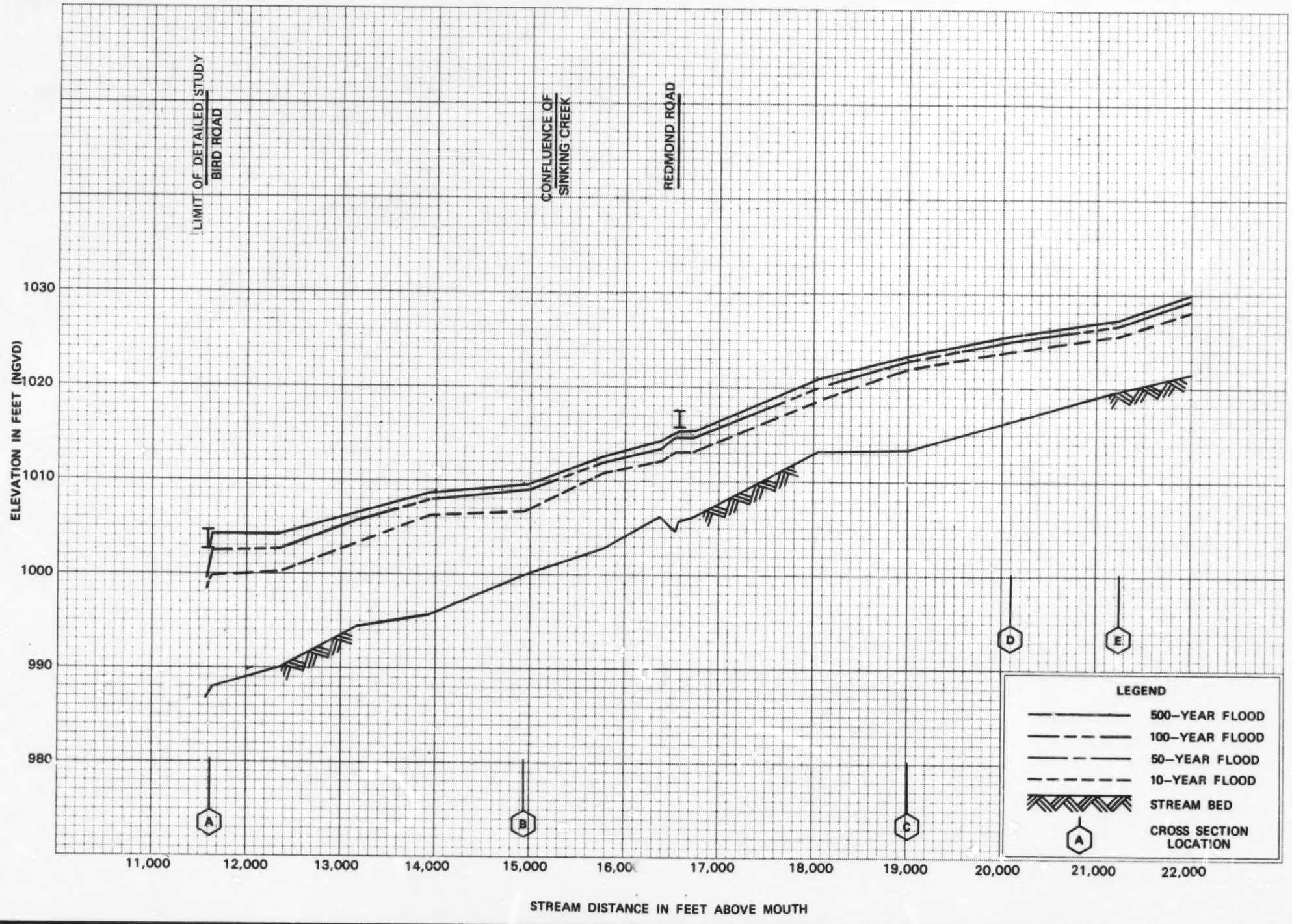

FLOOD PROFILES

BEAVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH
(UNINCORPORATED AREAS)

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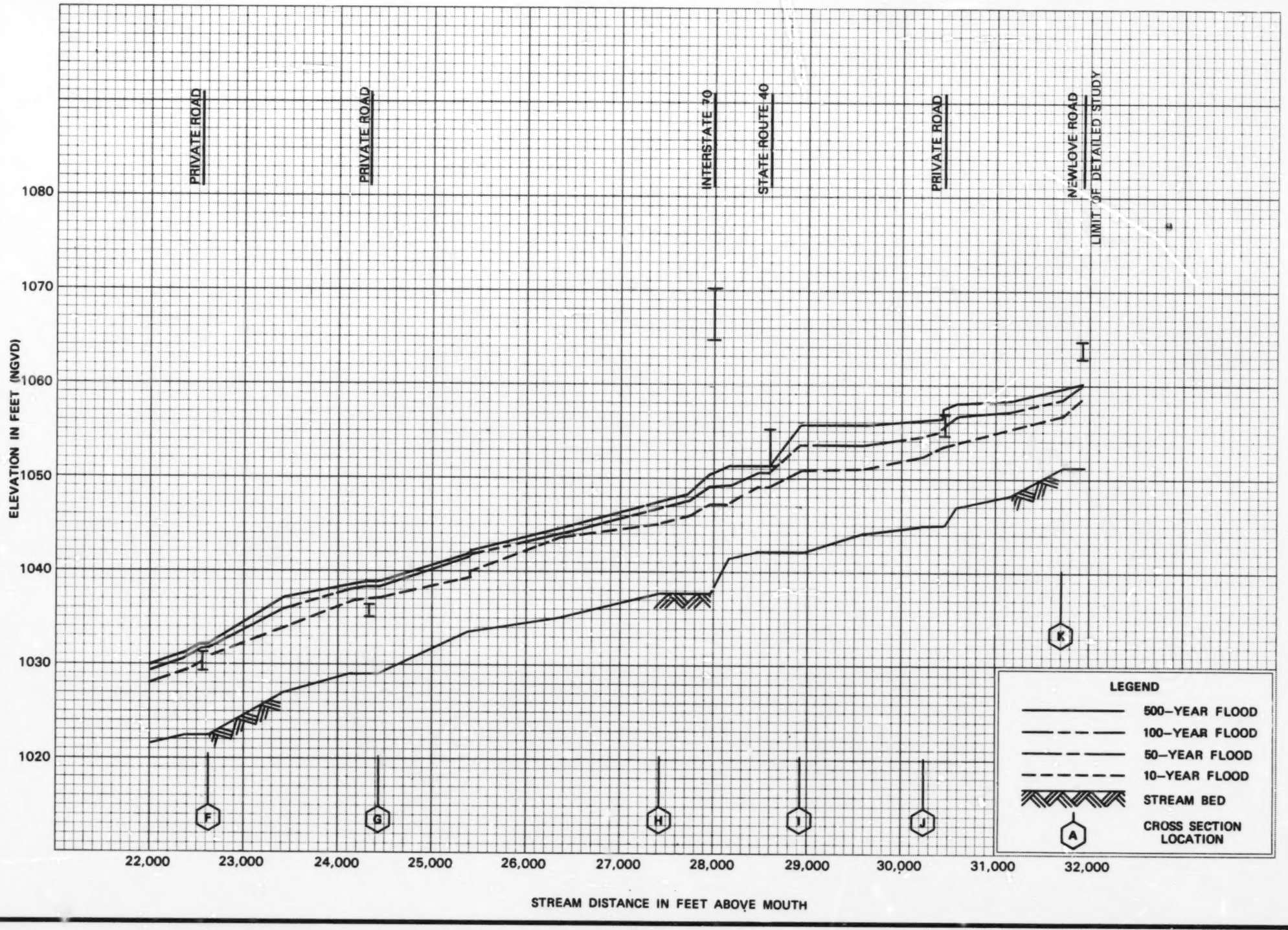

FLOOD PROFILES

BEAVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH
(UNINCORPORATED AREAS)

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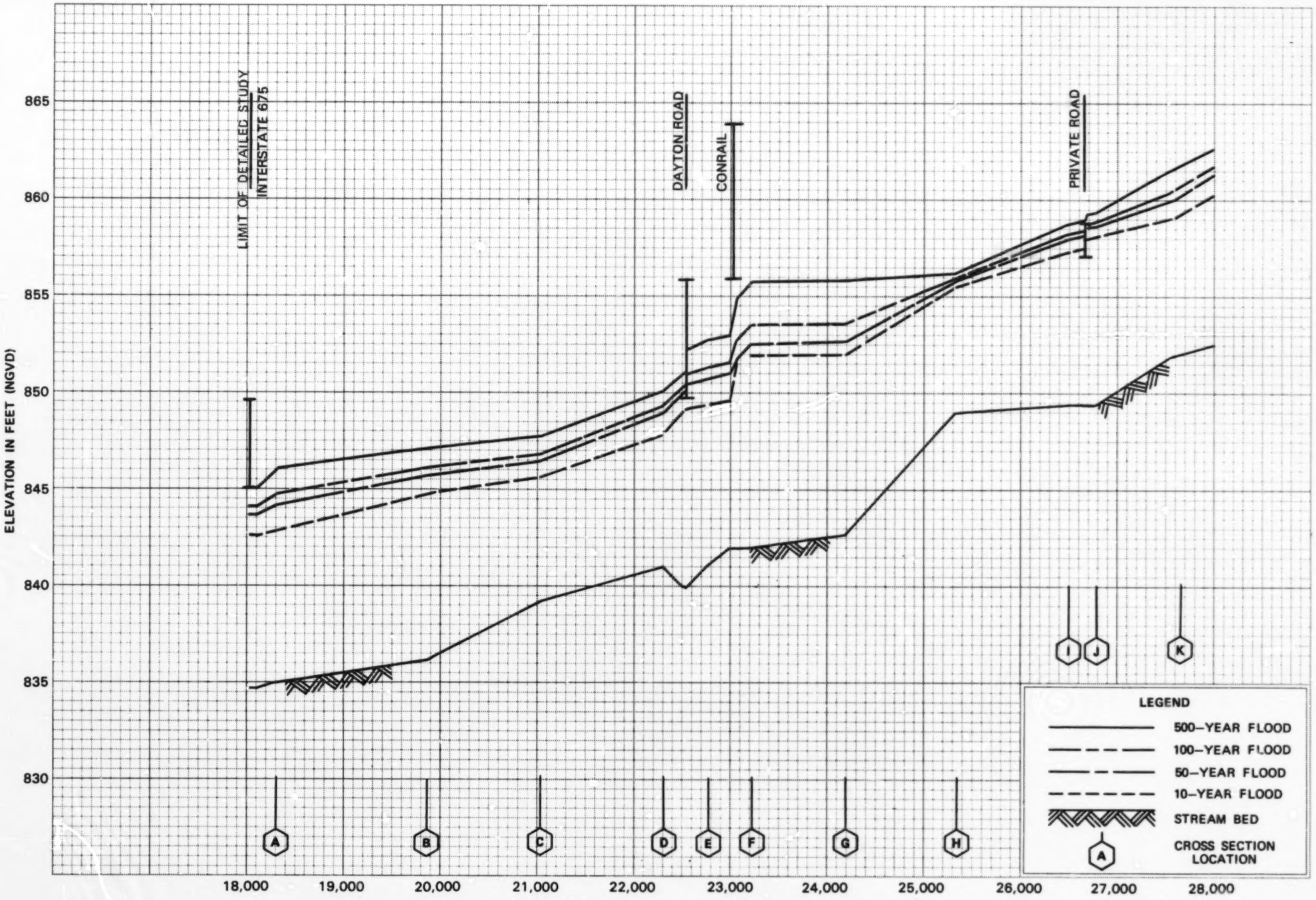

FLOOD PROFILES

MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

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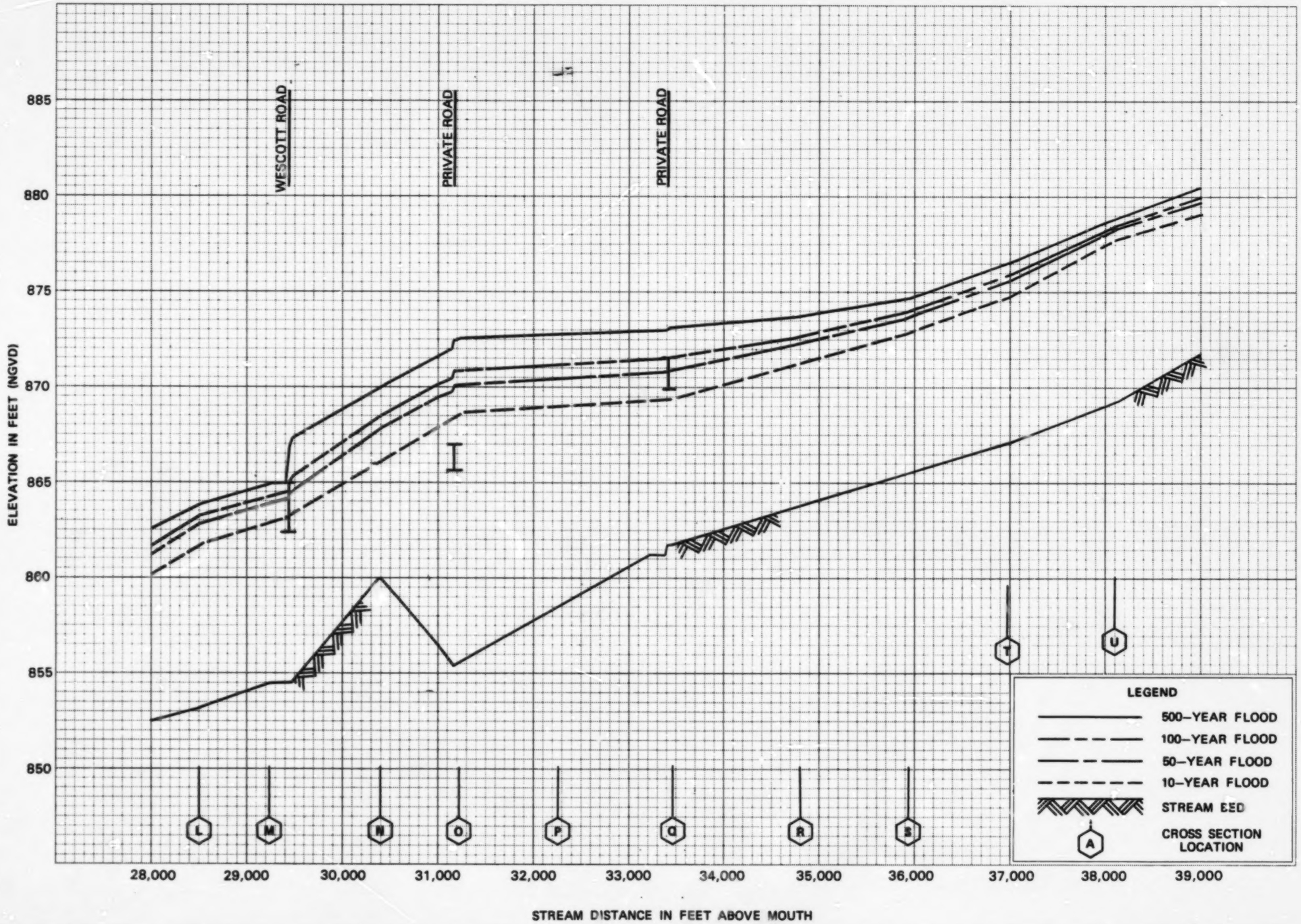

FLOOD PROFILES

MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

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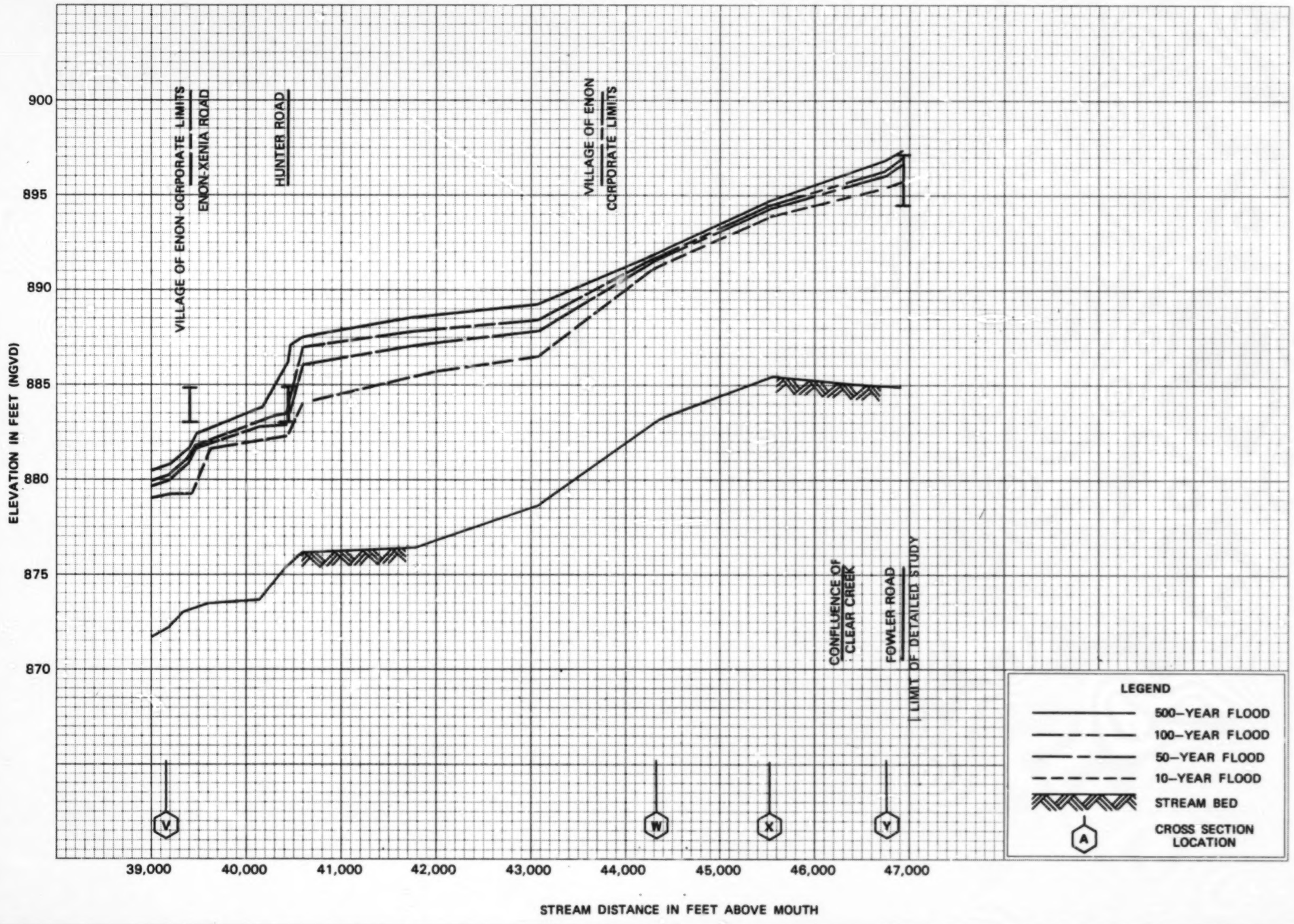

FLOOD PROFILES

MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CLARK COUNTY, OH

(UNINCORPORATED AREAS)

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